# Chapter 1 Introduction

#### 1-1. Purpose

The purpose of this engineer technical letter (ETL) is to provide guidance on minimum acceptable factors of safety against development of undesirable seepage emergence and sand boil initiation for flood control levees with a landside top stratum.

## 1-2. Applicability

This ETL applies to USACE commands having civil works responsibilities.

#### 1-3. References

#### **Biedenharn and Tracy 1987**

Biedenharn, D. G., and Tracy, F. T. 1987. "Finite Element Method Package for Solving Steady-State Seepage Problems," Technical Report ITL-87-6, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

### Brizendine, Taylor, and Gabr 1995

Brizendine, A. L., Taylor, H. M., Jr., and Gabr, M. A. 1995. "LEVSEEP: Analysis Software for Levee Underseepage and Rehabilitation," Technical Report GL-95-10, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

#### **Engineering Computer Graphics Laboratory 1996**

Engineering Computer Graphics Laboratory. 1996. "FastSEEP Automated Seepage Analysis Reference Manual," Brigham Young University, Provo, UT.

#### Gabr, Brizendine, and Taylor 1995

Gabr, M. A., Brizendine, A. L., and Taylor, H. M., Jr. 1995. "Comparison Between Finite Element Study and Simplified Analysis of Levee Underseepage," Technical Report GL-95-11, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

#### Gabr, Taylor, Brizendine, and Wolff 1995

Gabr, M. A., Taylor, H. M., Jr., Brizendine, A. L., and Wolff, T. F. 1995. "LEVEEMSU: Analysis Software for Levee Underseepage and Rehabilitation," Technical Report GL-95-9, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

#### **Knowles 1992**

Knowles, V. R. 1992. "Applications of the Finite Element Seepage Analysis Corps Program CSEEP (X8202)," Technical Report ITL-92-6, U.S. Army Engineer Waterways Experiment Staion, Vicksburg, MS.

#### **Tracy 1994**

Tracy, F. T. 1994. "Seepage Package," CSEEP Micro Version, X8202, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

# U.S. Army Engineer Waterways Experiment Station 1956

U.S. Army Engineer Waterways Experiment Station. 1956. "Investigation of Underseepage and Its Control, Lower Mississippi River Levees," Technical Memorandum No. TM-3-424, 2 Vols, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

#### Wolff 1989

Wolff, T. F. 1989. "LEVEEMSU: A Software Package Designed for Levee Underseepage Analysis," Technical Report GL-89-13, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.